WHAT IS CLAIMED IS:

1. A stretchable stent, comprising:

a coiled-up sheet having overlapping inner and outer longitudinal sections extending generally parallel to a longitudinal axis thereof, the coiled-up sheet being expandable between a contracted condition and one or more enlarged conditions; and

a plurality of stretchable elements formed in the coiled-up sheet, the stretchable elements being expandable between an unstretched condition and a stretched condition.

2. The stretchable stent of claim 1, wherein the coiled-up sheet is at least partially biased to expand from the contracted condition towards the one or more enlarged conditions.

3. The stretchable stent of claim 1, wherein the stretchable elements are biased to assume the stretched condition, thereby at least partially biasing the coiled-up sheet to radially expand from the contracted condition towards the one or more enlarged conditions.

4. The stretchable stent of claim 1, wherein the coiled-up sheet defines a periphery substantially perpendicular to the longitudinal axis, and wherein the stretchable elements are expandable about the periphery of the coiled-up sheet.

5. The stretchable stent of claim 1, wherein the coiled-up sheet comprises a material having a temperature-based shape memory, whereby the stretchable elements are biased towards the unstretched condition when exposed to a first temperature and towards the stretched condition when exposed to a second temperature.

6. The stretchable stent of claim 5, wherein the second temperature is at or above body temperature.

7. The stretchable stent of claim 5, wherein the first temperature is at or below about 25 degrees Celsius.

8. The stretchable stent of claim 5, wherein the coiled-up sheet comprises Nitinol.

9. The stretchable stent of claim 8, wherein the Nitinol is substantially in its martensitic phase at the first temperature and substantially in its austenitic phase at the second temperature.

10. The stretchable stent of claim 1, wherein the entire coiled-up sheet has stretchable elements formed therein.

11. The stretchable stent of claim 1, wherein the stretchable elements define a longitudinal stretchable region extending between first and second ends of the coiled-up sheet.

12. The stretchable stent of claim 1, wherein the stretchable elements define a stretchable crowning end on one end of the coiled-up sheet.

13. The stretchable stent of claim 1, wherein the coiled-up sheet further comprises a substantially nondeformable region.

14. The stretchable stent of claim 13, wherein the nondeformable region comprises a substantially rigid lattice-like structure.

15. The stretchable stent of claim 1, further comprising a plurality of locking elements extending from the inner longitudinal section for engaging openings in the outer longitudinal section to selectively secure the coiled-up sheet in the one or more enlarged conditions.

16. A stretchable stent, comprising:

a coiled-up sheet having overlapping inner and outer longitudinal sections, the coiled-up sheet being expandable between a contracted condition and one or more enlarged conditions, the coiled-up sheet defining a periphery in a plane substantially perpendicular to a longitudinal axis thereof;

a plurality of locking elements extending from the inner longitudinal section for engaging openings in the outer longitudinal section to selectively secure the coiled-up sheet in the one or more enlarged conditions; and

a plurality of stretchable elements formed in the coiled-up sheet, the stretchable elements having a shape memory defining an unstretched condition and a stretched condition.

17. The stretchable stent of claim 16, wherein the stretchable elements are biased to assume the stretched condition when exposed to a temperature at or above body temperature.

18. The stretchable stent of claim 16, wherein the stretchable elements define a longitudinal stretchable region extending between first and second ends of the coiled-up sheet.

19. The stretchable stent of claim 16, wherein the stretchable elements define a stretchable crowning end on an end of the coiled-up sheet.

20. The stretchable stent of claim 16, wherein the coiled-up sheet comprises Nitinol.

21. The stretchable stent of claim 20, wherein the stretchable elements comprise austenite at or above body temperature.

22. The stretchable stent of claim 20, wherein the stretchable elements comprise martensite at or below about 25 degrees Celsius.

23. The stretchable stent of claim 1, wherein the coiled-up sheet comprises a nondeformable region that is generally incompressible about the periphery.

24. The stretchable stent of claim 23, wherein the nondeformable region comprises a lattice-like structure including the openings for receiving the locking elements.

25. The stretchable stent of claim 16, wherein the stretchable elements comprise a multi-cellular structure of diamond-shaped elements capable of assuming unstretched and stretched conditions.

26. The stretchable stent of claim 25, wherein the diamond-shaped elements comprise peripheral apices extending generally along the peripheral dimension, the peripheral apices having peripherally extending nipples for reducing longitudinal foreshortening when the diamond-shaped elements are directed from the unstretched condition to the stretched condition.

27. The stretchable stent of claim 25, wherein the diamond-shaped elements are partially invertable to assume the unstretched condition.

28. The stretchable stent of claim 16, wherein the stretchable elements define a multi-cellular structure comprising a plurality of zigzag elements extending about the periphery of the coiled-up sheet, and a plurality of longitudinal elements intersecting the zigzag elements.

29. The stretchable stent of claim 16, wherein each stretchable element comprises a pair of peripherally expandable wing-like elements extending generally parallel to the longitudinal axis.

30. The stretchable stent of claim 29, wherein the stretchable elements define a multi-cellular structure with peripherally adjacent stretchable elements being connected at a point intermediate the pair of wing-like elements.

31. A method for making a coiled-sheet stent, the method comprising the steps of:

providing a substantially flat sheet defining a length and a width;

forming a plurality of stretchable elements in the sheet, the stretchable elements being expandable along the width of the sheet between an unstretched condition and a stretched condition; and

rolling the flat sheet about the width into a coiled-up sheet having overlapping inner and outer longitudinal sections.

32. The method of claim 31, wherein the sheet comprises a shape memory material, and wherein at least one of the unstretched and stretched shapes is programmed into the shape memory material during the step of forming the stretchable elements.

33. The method of claim 32, wherein the step of forming the stretchable elements comprises the steps of:

forming the stretchable elements in the sheet in the stretched shape; and

heat treating the sheet to program the stretched shape into the shape memory material.

34. The method of claim 33, comprising the additional step of constraining the stretchable elements in the unstretched shape after the heat treating step.

35. The method of claim 33, wherein the shape memory material comprises Nitinol, and wherein the Nitinol comprises austenite during the heat treating step.

36. The method of claim 35, wherein the sheet is heated to a temperature of at least about body temperature, the temperature being sufficiently high such that the Nitinol substantially completes austenitic transformation.

37. The method of claim 35, comprising the additional step of cooling the sheet after the heat treating step, the Nitinol comprising martensite after the cooling step.

38. The method of claim 37, wherein the sheet is cooled to a temperature of about 25 degrees Celsius or less, the temperature being sufficiently low such that the Nitinol substantially completes martensitic transformation.

39. The method of claim 37, comprising the additional step of plastically deforming the stretchable elements to their unstretched shape after the cooling step.

40. The method of claim 32, wherein the step of forming the stretchable elements comprises the steps of:

forming the stretchable elements in the sheet in their unstretched shape;

plastically deforming the stretchable elements to their stretched shape; and

heat treating the sheet to program the stretched shape into the shape memory material.

41. The method of claim 40, comprising the additional step of cooling the sheet after the heat treating step, thereby causing the stretchable elements to return to their unstretched shape.

42. The method of claim 31, wherein the stretchable elements are formed in the sheet by chemical etching, laser cutting or punching.

43. The method of claim 31, comprising the additional step of forming a plurality of locking elements along an edge of the sheet extending along the length thereof.

44. A method for deploying a coiled-sheet stent at a target treatment location within a patient's body, the method comprising the steps of:

providing a coiled-sheet stent comprising a temperature-activated shape memory material, the coiled-sheet stent comprising a plurality of stretchable elements having a shape memory defining an unstretched condition and a stretched condition, the stretchable elements being biased to assume the stretched condition when exposed to a temperature at or above body temperature;

providing the coiled-sheet stent in a contracted condition within a distal end of a tubular sheath at a temperature substantially below body temperature;

percutaneously introducing the distal end of the sheath into a blood vessel of a patient;

advancing the distal end of the sheath to a target treatment location, the coiled-sheet stent becoming exposed to a temperature within the patient of at least about body temperature

during advancement, whereby the stretchable elements become biased to assume the stretched shape; and

deploying the coiled-sheet stent at the target treatment location, the coiled-sheet stent at least partially expanding towards an enlarged condition due to the bias of the stretchable elements towards the stretched shape.

45. The method of claim 44, comprising the additional step of further expanding the coiled-sheet to an enlarged condition at which the coiled-sheet substantially engages the vessel wall at the target treatment location.

46. A stent for implantation within a body lumen of a patient, comprising:

a generally tubular body expandable between a contracted condition for facilitating introduction into a body lumen, and an enlarged condition for engaging the body lumen, the tubular body having open ends defining a longitudinal axis therebetween; and

a set of struts formed in the tubular body, the struts having a width dimension extending along a wall of the tubular body, and a thickness dimension extending radially outward substantially perpendicular to the longitudinal axis;

wherein the ratio of the thickness dimension to the width dimension is greater than one.

47. The stent of claim 46, wherein the tubular body comprises a coiled-up sheet having overlapping inner and outer longitudinal sections extending generally parallel to a longitudinal axis thereof.

48. The stent of claim 46, wherein the tubular body comprises a substantially enclosed tubular structure.

49. The stent of claim 48, wherein the tubular structure is biased to assume the enlarged condition.

50. The stent of claim 48, wherein the tubular structure is plastically deformable from the contracted condition to the enlarged condition.